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Codiaeum variegatum var. *cavernicola* var. nov. (Euphorbiaceae), the second *Codiaeum* from Borneo

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Abstract

Codiaeum variegatum (L.) Blume var. *cavernicola*, a cave dwelling shrub, is described from two limestone hills (Dulong Lambu and Madai) in Sabah, Malaysia.

Introduction

Merrill (1926) had already noted that *Codiaeum* is extremely poorly represented in Borneo; in his time there being a single wild species, *C. affine* Merrill. *C. affine* is still known only from the type collection from Banggi Island, Sabah.

A second taxon is described here. It differs from *C. affine* in its broader leaves 5.5–8.5 cm wide, with longer petioles 9–13 cm long (as opposed to *C. affine* with leaves 4 cm wide and petioles 5–7 cm long), fewer stamens (25 versus about 50 in *C. affine*), and trifid style (bifid in *C. affine*).

Merrill (1926) considered *C. affine* to belong to a group of Philippine species that have bifid styles, e.g. *C. luzonicum* Merr. and *C. palawanense* Elmer. The latter two have much larger laminas (up to 45 by 10 cm) than *C. affine* (15–25 by 4–6 cm). According to Merrill the main difference between *C. affine* and the other two is in the presence in *C. affine* of an upper sessile leaf subtending the inflorescence, which seems to be present in at least some specimens (called bract in our description), and absent from *C. luzonicum* and *C. palawanense*. This bract in *C. affine* is c. 9 by 4

cm, much larger than the one in the variety we describe here (up to 3.25 by 2.5 cm in *C. variegatum* var. *cavernicola*).

In the trifid style, fewer stamens and the five disc glands of the staminate flower, the new taxon is closer to wild plants of *C. variegatum* (L.) Blume, which is a species of the W. Pacific and Polynesian islands reaching its most northerly limit on the coasts of E. Java. It is not known wild in Borneo, although cultivated forms of *C. variegatum* are widely planted. The new variety differs from other wild populations of *C. variegatum*, which have shorter petioles (0.5–5 cm long), longer pedicels (3 cm long at the staminate flower and short, thick styles. These distinctions, coupled with its unique habitat, warrant its recognition as an ecovariety of the widespread *C. variegatum*.

Codiaeum variegatum (L.) Blume var. ***cavernicola*** Kiew & Welzen **var. nov.**

Typus: *Kiew & Lim BDL-1*, 29 Oct 1996 (staminate plant) - holo SING.

A *Codiaeo affini* foliis latioribus et staminibus paucioribus. a *C. variegato* pedicellis masculinis brevioribus, ab ambobus petiolis longioribus differt.

Erect shrub 0.5–2 m tall. *Stem* glabrous, slender up to 4–5 mm thick in dried state. *Leaves* spiral, thinly subcoriaceous, glabrous, matt above: petiole slender, 9.25–13.25 cm long, lamina slightly oblanceolate to broadly oblong, 17.5–25 cm by 5.5–8.5 cm, index 2.9–3.2, base cuneate, margin entire, apex bluntly acuminate, midrib plane above, prominent beneath, veins 9–14 pairs, scarcely prominent above and beneath, perpendicular to midrib and margin, looped and closed near the margin, tertiary venation faint. Bracts foliaceous, sessile, broadly oval, 2.5–3.25 by 2.3–2.5 cm, bracteoles c. 1 mm long. *Inflorescences* axillary racemes, slender, erect, glabrous, one per axil. unbranched, 5-merous. Staminate inflorescences 12–15 cm long, of which the peduncle 0.75–5.5 cm long. *Staminate flowers* in clusters of up to 3 spaced 1–3 mm apart with the flowers developing in succession: mature buds globose, 3 mm diam.; pedicels slender, up to 10 mm by 0.75 mm; in open flower calyx lobes strongly reflexed. calyx c. 5 mm long, lobes c. 2.5 by 2.5 mm, margin recurved; corolla thin and delicate, c. 2 mm long with narrow base, broadening distally to 3 mm wide, apex shallowly bilobed and reflexed; disc glands 5, fleshy, c. 1 by 1.25 mm, grooved above; stamens c. 25, filament 1.5–4 mm long, anther spathulate, c. 1 by 1 mm, connective broad; pistillode absent. Pistillate inflorescences 17–36.5 cm long, of which the peduncle 7–20 cm. *Pistillode flowers* solitary, 3–13 mm apart, sessile or with pedicel up to 3 mm long, calyx orbicular-ovate, glabrous. c. 1.5 by 1

mm; corolla absent: disc absent; ovary glabrous. columnar with 3 longitudinal grooves corresponding to 3 locules. 3–4 mm by 2–2.5 mm, 1 ovule per locule, style trifid, filiform, c. 6 mm long. *Fruit* a regma, apex and base flattened, c. 8 by 10 mm, glabrous, septicidal, splitting into 3 cocci, later twisting and falling from central column on drying; pedicel elongating to 4 mm long and stout, c. 1.5 mm thick; calyx and style base persistent, epicarp fleshy, c. 0.3 mm thick; mesocarp fibrous, c. 0.75 mm thick. *Seeds* ovoid, c. 6 mm long, 4.5 mm wide and 5.5 mm thick; testa smooth and hard, c. 0.5 mm thick, brown and minutely speckled black; endosperm copious.

Distribution: Borneo, variety endemic to Sabah (Dulong Lambu and Madai). Bulit Dulong Lambu is commonly, though incorrectly, referred to as Gomantong Cave (Lim and Kiew, 1997).

Codiaeum variegatum is distributed from the Pacific Islands to E. Java, the two Sabah populations represent the species' most northerly limit of geographical distribution. In E. Java, wild populations of *C. variegatum* are found only in coastal areas in Nusa Burung. Since coastal areas are relatively well collected, its absence from this habitat in Borneo is not due to an artefact of botanical collection.

Ecology: Elsewhere *Codiaeum variegatum* grows in open areas but in Sabah the new variety is restricted to limestone, where it grows inside caves.

Specimens examined: BORNEO: Sabah - Bukit Dulong Lambu, Simud Hitam Cave *Kokawa & Hotta 533* 31 October 1968 (SAN), *Meijer SAN 136164* 21 June 1992 (unicate SAN); *Kiew & Lim BDL-1* 29 October 1996 (unicate SING), *BDL-2* (unicate L); Madai Cave *A. Berhaman et al. AB 90* 10 June 1996 (SAN. SING).

Notes: *Codiaeum variegatum* var. *cavernicola* is presently known from two localities, both on limestone, and brings to eight the number of Bornean euphorbs restricted to limestone (Airy Shaw, 1975), of which four are endemic to Borneo (three from Sarawak and *C. variegatum* var. *cavernicola* from Sabah). The varietal epithet reflects its cave-dwelling habitat. The two caves from which it is known are famous for their bird's nests. The annual harvest from the Simud Hitam Cave is estimated at about one million Malaysian dollars.

That it is not widespread is probably due to its extremely specialised niche. It grows within caves on limestone rubble rooted in guano, where light reaches the floor of the cave. In the case of Simud Hitam Cave, collapse of a large part of the upper cave wall has opened a 'window'

through which skylight penetrates to the cave floor. In this cave, var. *cavernicola* forms a dense shrubby thicket but does not extend into areas with a soft, deep layer of guano. This habitat has not so far been encountered on other limestone hills in Sabah, which perhaps accounts for its absence elsewhere.

These two isolated populations exhibit some differences. The Madai Cave population includes plants with leaves with a large number of veins (13 or 14 pairs as opposed to 9–11 in leaves of the Simud Hitam Cave population) and longer pistillate inflorescences (up to 36.5 cm versus 17 cm in Simud Hitam Cave plants) with longer pedicels (up to 3 mm versus sessile in Simud Hitam Cave plants).

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